

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the present application.

IN THE CLAIMS:

Claim 1. (Currently Amended) A nucleic acid isolated from a plant comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1\rightarrow6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

- (a) a nucleotide sequence of SEQ ID NO:1,
- (b) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2,
- (c) a nucleotide sequence of SEQ ID NO:3,
- (d) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:4,
- (e) a nucleotide sequence of SEQ ID NO:5,
- (f) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:6,
- (g) a nucleotide sequence of SEQ ID NO:7,

(h) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:8,

(i) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:9, SEQ ID NO:15, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, and SEQ ID NO:58 and a PCR primer selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:17, and SEQ ID NO:53, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (a) or (b), in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(j) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:12, SEQ ID NO:19, SEQ ID NO:65, and SEQ ID NO:68 and a PCR primer selected from the group consisting of SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:21, and SEQ ID NO:70, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (c) or (d), in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(k) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid obtained from a lamiaceous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:71 and SEQ ID NO:73 and a PCR primer selected from the group consisting of SEQ ID NO:72 and SEQ ID NO:74, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (e) or (f), in 0.9 M NaCl, 0.09 M citric acid at 65°C, and

(l) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified via the RACE process from a nucleic acid obtained from a monocotyledon with a PCR primer selected from the group consisting of SEQ ID NO:77 and SEQ ID NO:78, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (g) or (h), in 0.9 M NaCl, 0.09 M citric acid at 65°C.

Claims 2-3. (Canceled).

Claim 4. (Previously Presented) The isolated nucleic acid according to claim 1, wherein the leguminous plant in (i) is broad bean.

Claim 5. (Canceled).

Claim 6. (Previously Presented) An isolated nucleic acid comprising the nucleotide sequence of SEQ ID NO:1.

Claim 7. (Previously Presented) The isolated nucleic acid according to claim 1, wherein the leguminous plant in (j) is soybean.

Claim 8. (Canceled).

Claim 9. (Previously Presented) An isolated nucleic acid comprising the nucleotide sequence of SEQ ID NO:3.

Claim 10. (Canceled).

Claim 11. (Previously Presented) The isolated nucleic acid according to claim 1, wherein the lamiaceous plant in (k) is Japanese artichoke.

Claim 12. (Previously Presented) An isolated nucleic acid comprising a nucleotide sequence coding for the amino acid sequence of SEQ ID NO:6.

Claim 13. (Previously Presented) An isolated nucleic acid comprising the nucleotide sequence of SEQ ID NO:5.

Claim 14. (Canceled).

Claim 15. (Previously Presented) The isolated nucleic acid according to claim 1, wherein the monocotyledon in (1) is a gramineous plant.

Claim 16. (Previously Presented) The isolated nucleic acid according to claim 15, wherein the gramineous plant is corn.

Claim 17. (Previously Presented) An isolated nucleic acid comprising a nucleotide sequence coding for the amino acid sequence of SEQ ID NO:8.

Claim 18. (Previously Presented) An isolated nucleic acid comprising the nucleotide sequence of SEQ ID NO:7.

Claims 19-29. (Canceled).

Claim 30. (Currently Amended) A chimera gene comprising:

a nucleic acid isolated from a plant comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1\rightarrow6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

- (a) a nucleotide sequence of SEQ ID NO:1,
- (b) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2,
- (c) a nucleotide sequence of SEQ ID NO:3,
- (d) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:4,
- (e) a nucleotide sequence of SEQ ID NO:5,
- (f) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:6,
- (g) a nucleotide sequence of SEQ ID NO:7,
- (h) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:8,

(i) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:9, SEQ ID NO:15, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, and SEQ ID NO:58 and a PCR primer selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:17, and SEQ ID NO:53, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (a) or (b), in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(j) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:12, SEQ ID NO:19, SEQ ID NO:65, and SEQ ID NO:68 and a PCR primer selected from the group consisting of SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:21, and SEQ ID NO:70, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (c) or (d), in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(k) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid

obtained from a lamiaceous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:71 and SEQ ID NO:73 and a PCR primer selected from the group consisting of SEQ ID NO:72 and SEQ ID NO:74, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (e) or (f), in 0.9 M NaCl, 0.09 M citric acid at 65°C, and

(1) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified via the RACE process from a nucleic acid obtained from a monocotyledon with a PCR primer selected from the group consisting of SEQ ID NO:77 and SEQ ID NO:78, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (g) or (h), in 0.9 M NaCl, 0.09 M citric acid at 65°C, and a promoter linked thereto.

Claim 31. (Original) A transformant obtained by introducing the chimera gene of claim 30 into a host organism.

Claim 32. (Currently Amended) A plasmid comprising a nucleic acid isolated from a plant comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by

combining a D-galactosyl group through an $\alpha(1\rightarrow6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

- (a) a nucleotide sequence of SEQ ID NO:1,
- (b) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2,
- (c) a nucleotide sequence of SEQ ID NO:3,
- (d) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:4,
- (e) a nucleotide sequence of SEQ ID NO:5,
- (f) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:6,
- (g) a nucleotide sequence of SEQ ID NO:7,
- (h) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:8,
- (i) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:9, SEQ ID NO:15, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, and SEQ ID NO:58 and a PCR

primer selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:17, and SEQ ID NO:53, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (a) or (b), in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(j) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:12, SEQ ID NO:19, SEQ ID NO:65, and SEQ ID NO:68 and a PCR primer selected from the group consisting of SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:21, and SEQ ID NO:70, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (c) or (d), in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(k) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid obtained from a lamiaceous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:71 and SEQ ID NO:73 and a PCR primer selected from the group consisting of SEQ ID NO:72 and SEQ ID NO:74, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the

nucleotide sequence of (e) or (f), in 0.9 M NaCl, 0.09 M citric acid at 65°C, and

(l) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified via the RACE process from a nucleic acid obtained from a monocotyledon with a PCR primer selected from the group consisting of SEQ ID NO:77 and SEQ ID NO:78, wherein said nucleotide sequence ~~is-hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (g) or (h), in 0.9 M NaCl, 0.09 M citric acid at 65°C.

Claim 33. (Original) A host organism transformed with the plasmid of claim 32, or a cell thereof.

Claim 34. (Original) A microorganism transformed with the plasmid of claim 32.

Claim 35. (Original) A plant transformed with the plasmid of claim 32, or a cell thereof.

Claim 36. (Currently Amended) A method for metabolic modification, which comprises introducing a nucleic acid isolated from a plant comprising a nucleotide sequence coding for an amino

acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1\rightarrow6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

- (a) a nucleotide sequence of SEQ ID NO:1,
- (b) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2,
- (c) a nucleotide sequence of SEQ ID NO:3,
- (d) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:4,
- (e) a nucleotide sequence of SEQ ID NO:5,
- (f) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:6,
- (g) a nucleotide sequence of SEQ ID NO:7,
- (h) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:8,
- (i) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:9, SEQ ID NO:15, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, and SEQ ID NO:58 and a PCR

primer selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:17, and SEQ ID NO:53, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (a) or (b), in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(j) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:12, SEQ ID NO:19, SEQ ID NO:65, and SEQ ID NO:68 and a PCR primer selected from the group consisting of SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:21, and SEQ ID NO:70, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (c) or (d), in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(k) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified from a nucleic acid obtained from a lamiaceous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:71 and SEQ ID NO:73 and a PCR primer selected from the group consisting of SEQ ID NO:72 and SEQ ID NO:74, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the

nucleotide sequence of (e) or (f), in 0.9 M NaCl, 0.09 M citric acid at 65°C, and

(1) a nucleotide sequence ~~obtainable~~ obtained from a polynucleotide which is ~~amplifiable~~ amplified via the RACE process from a nucleic acid obtained from a monocotyledon with a PCR primer selected from the group consisting of SEQ ID NO:77 and SEQ ID NO:78, wherein said nucleotide sequence ~~is hybridizable~~ hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (g) or (h), in 0.9 M NaCl, 0.09 M citric acid at 65°C, into a host organism or a cell thereof, so that the content of raffinose family oligosaccharides in the host organism or the cell thereof is changed.

Claims 37-39. (Canceled).

Claim 40. (Previously Presented) An isolated nucleic acid comprising (i) a polynucleotide having a sequence that encodes a protein having an amino acid sequence selected from the group consisting of SEQ ID NOs:2, 4, 6, or 8 or (ii) a polynucleotide having a sequence complementary to said sequence.

Claim 41. (Previously Presented) An isolated nucleic acid comprising (i) a polynucleotide having a nucleotide sequence selected from the group consisting of SEQ ID NOs:1, 3, 5, or 7 or (ii) a polynucleotide having a sequence complementary to said sequence.

Claim 42. (Canceled).

Claim 43. (Previously Presented) An isolated nucleic acid comprising a nucleotide sequence coding for the amino acid sequence of SEQ ID NO:2.

Claim 44. (Previously Presented) An isolated nucleic acid comprising a nucleotide sequence coding for the amino acid sequence of SEQ ID NO:4.

Claim 45. (New) A nucleic acid isolated from a plant comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1\rightarrow6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein

said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

- (a) a nucleotide sequence of SEQ ID NO:1,
- (b) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2,
- (c) a nucleotide sequence of SEQ ID NO:3,
- (d) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:4,
- (e) a nucleotide sequence of SEQ ID NO:5,
- (f) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:6,
- (g) a nucleotide sequence of SEQ ID NO:7,
- (h) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:8,
- (i) a nucleotide sequence obtained from a polynucleotide which is amplified from a nucleic acid obtained from broad bean with a combination of a PCR primer selected from the group consisting of SEQ ID NO:9, SEQ ID NO:15, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, and SEQ ID NO:58 and a PCR primer selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:17, and SEQ ID NO:53, wherein said nucleotide sequence hybridizes with a nucleotide

sequence complementary to the nucleotide sequence of (a) or (b), in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(j) a nucleotide sequence obtained from a polynucleotide which is amplified from a nucleic acid obtained from soybean with a combination of a PCR primer selected from the group consisting of SEQ ID NO:12, SEQ ID NO:19, SEQ ID NO:65, and SEQ ID NO:68 and a PCR primer selected from the group consisting of SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:21, and SEQ ID NO:70, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (c) or (d), in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(k) a nucleotide sequence obtained from a polynucleotide which is amplified from a nucleic acid obtained from Japanese artichoke with a combination of a PCR primer selected from the group consisting of SEQ ID NO:71 and SEQ ID NO:73 and a PCR primer selected from the group consisting of SEQ ID NO:72 and SEQ ID NO:74, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (e) or (f), in 0.9 M NaCl, 0.09 M citric acid at 65°C, and

(l) a nucleotide sequence obtained from a polynucleotide which is amplified via the RACE process from a nucleic acid obtained from corn with a PCR primer selected from the group consisting of SEQ ID

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NO:77 and SEQ ID NO:78, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of (g) or (h), in 0.9 M NaCl, 0.09 M citric acid at 65°C.